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surface tension, or of Ostwald on conductivity, to verify this statement.

If in so short a time such advances have been made, it seems reasonable to expect much from work in this very imperfectly explored field, which belongs neither to physics nor chemistry, but is a distinct region, lying between these two, and employs, in addition to its own, some of the theoretical and experimental methods belonging to both.

HARRY C. JONES.

CHEMICAL LABORATORY,
JOHNS HOPKINS UNIVERSITY.

TAPIRS PAST AND PRESENT.

AN important contribution to our knowledge of the structure and origin of the tapirs has recently been made by Mr. J. B. Hatcher,* of Princeton University. The distribution of the recent tapirs remained an enigma until the discoveries by paleontologists solved the problem. We now know that in former geological epochs, and as early as the Oligocene, the true tapirs were generally distributed over the northern hemisphere of both continents, and that probably owing to geographical and climatic changes the present tapirs were stranded as it were in two widely separated areas of the globe, that is to say, in the Malay Archipelago and in South America.

In a number of the mammalian orders, there are types of great interest to the morphologist, which are called generalized or collective types. These forms include many characters in their structure which are primitive, and they are of great assistance in unravelling the phylogenetic history of the mammalia. The tapir is such a generalized member of the perissodactyle division of the ungulates, and it represents in a certain degree, especially in the structure of the feet, the ancestral type from which arose all the modern odd-toed ungulates.

* Recent and Fossil Tapirs, by J. B. Hatcher, Am. Jour. Sci., March, 1896.

It is surprising how little change the tapir has undergone since the Oligocene, and the genus *Protapirus* based upon the dental characters alone can hardly be separated generically from the recent tapir. The structure of the skull in *Protapirus* is decidedly more primitive than that of any of the living tapirs. In *Protapirus validus*, of the White River Oligocene of the United States, the skull is elongated and compressed, in contrast with recent species the nasals project farther forward, and consequently the proboscis in this ancient tapir was probably much smaller than in recent forms. The shape of the nasal bones is quite different from that of recent tapirs, as in these the nasals are deeply excavated proximally into fossæ which lodge the large air sinuses. In *Protapirus*, however, these fossæ are represented by two long and narrow grooves, one on each side of the nasals, and these grooves extend farther forward on the skull than in the living tapirs.

In *Protapirus validus* the cranial portion of the skull is much elongated and the sagittal crest is prominent; on the other hand, the postglenoid and paroccipital processes are united and close the external auditory meatus inferiorly. This is decidedly a specialized character of *Protapirus* and is not found in the skull of any of the existing tapirs. In comparing the recent with the fossil tapirs Mr. Hatcher finds that the skull of *Tapirus roulini* (Syn. *T. pinchacus*) more closely resembles that of the fossil *Protapirus validus* than any other of the living tapirs. *Tapirus roulini* is rather aberrant in its distribution, as it is found in the high latitudes of the Andes. The osteology of this species has been very fully described by Döderlein.*

I see no use in reviving the generic name *Elasmognathus* Gill. The ossification of the mesethmoid in this form is not considered

* Über das skelet des Tapirus Pinchacus, Inaugural Dissertation, Bonn, 1877.

a valid generic character by most authorities. The absence of a sagittal crest in *Tapirus bairdii* and the molariform structure of the second superior premolar, a character which is found in other species of *Tapirus*, can hardly be considered of generic value.

The relations of the American and European species of fossil tapir have been very fully discussed by Wortman* and Earle, and since their paper was written I have studied the original types of *Protapirus* occurring in the Eocene and Oligocene of France. I see no reason in changing the conclusions stated by these authors. The opinion† has been advanced that the fossil tapir from the Lower Miocene of St. Gérard-le-Puy, in France, was really a species of the American genus *Colodon*. I strongly dissent from this idea, as, after having examined the original type of *Protapirus douvillei*, I can confidently state that it is a true tapir and not very closely related to *Colodon*. Again, *Protapirus priscus* of the Phosphorites belongs in the same genus as the remains of the animal from St. Gérard-le-Puy. As the Phosphorites is 'un grand mélange,' the position stratigraphically of the French species of *Protapirus* is about the same; the Phosphorites probably including the space of time, between the Upper Eocene, Gypse de Paris, and the Lower Miocene or Oligocene, of St. Gérard-le-Puy. As the evidence now stands I can see no reason for burdening paleontological literature with another new name for the American forms of *Protapirus*.

In my opinion there is ample proof to show that the American genus *Hyrachyus* occurs in the Middle Eocene of France, Argenton. Monsieur Filhol‡ has described a lower jaw with complete dentition and

also isolated upper molars, which agree structurally with those of the typical *Hyrachyus* of the Bridger.

In conclusion I do not see that Mr. Hatcher brings forward any new evidence to prove that the line of the true tapirs was not already in the Middle Eocene, Bridger, perfectly distinct from that of the pseudo-tapirs.

Osborn and Wortman have described the structure of the feet in *Heptodon calciculus* of the Wind River Eocene, and these authors have shown that in *Heptodon* the middle metapodial was already enlarged, as compared with the lateral metapodials, and this increase in size, tending to monodactylism, culminated in the genus *Colodon* of the White River Oligocene.

The ancestral form of the true tapir from the Bridger is not yet clearly made out, as the relationship of the two species of *Isectolophus* to the tapir phylum is rather obscure.

CHARLES EARLE.

NEW ROCHELLE, N. Y.

ON THE OCCURRENCE OF *TROCHOSPHERA SOLSTITIALIS* IN THE ILLINOIS RIVER.

THIS interesting and remarkable rotifer occurred sparingly in collections made at the biological station of the University of Illinois during the months of June, July and August, in the summer of 1896, in the Illinois River at Havana, and in a permanent marsh in the adjacent bottom-lands locally known as Flag Lake. The species was described by Surgeon Thorpe, R. N., from collections made in August, 1892, in a pond near Wuhu, on the Yangtze-Kiang River. As its specific name indicates, it differs from *T. æquatorialis* Semper, in the position of the girdle of cilia. Semper's species, found in 1859 in the rice fields of the Phillipine Islands, was also rediscovered by Thorpe in 1889 in ponds of the Acclimatization Society at Brisbane, Australia. Of its occurrence elsewhere nothing

* Bull. Am. Mus. Nat. Hist., Aug., 1893.

† Bull. Am. Mus. Nat. Hist., Dec., 1895, p. 362.

‡ Mém. sur Lophiodon, Mém. Soc. Géol. de France, 1888, Tome V.